THE CHARACTERISTICS OF THE FAMILY OF SCATOPHAGOID FISHES.

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The genus *Scatophagus* has been by general consent associated closely with the *Chætodontids* and *Ephippiids* in one and the same family. Only two ichthyologists have dissented from the current view.

Bleeker, in 1859, suggested a family (*Pimelepteroidei*) subdivided into three subfamilies (*Crenidentiformes*, *Pimelepteriformes*, and *Ephippiiformes*). Under the *Ephippiiformes* were combined the genera *Ephippus*, *Drepane*, *Scatophagus*, and the extinct *Pygæus*.

Bleeker, in 1876, referred the genus *Scatophagus* (then called by him *Ephippus*) back to the "*Chætodontoidei*," but isolated it thereunder as the representative of a subfamily "*Scatophagiformes*."

Gill, in 1883, suggested that "*Scatophagus*, judging from the figure of its skeleton (Agassiz's *Poissons Fossiles*, t. 4, pl. II, f. 1), belongs to a peculiar family, the *Scatophagidæ*, the ribs of which are simple and received in sockets comparatively high on the centra, and, apparently,* the posttemporal is forked. In fact, *Scatophagus* appears to have no direct affinity with the Chætodontids."

The subsequent examination of a skeleton (made from a dried specimen kindly forwarded to me by William P. Sclater, esq., of Calcutta) confirms the deduction from the previous consideration of the exterior of the fish combined with the figure of the skeleton. The family is quite distinct, and not even closely related to the Chætodontids or Ephippiids. The principal characteristics are now given under (1) a super-family and (2) a family caption.

SCATOPHAGOIDEA.

Acanthopterygians with a myodome, the posttemporal bifurcate and connected by extensive suture with the cranium, the posterior process extending upwards to the supraoccipital and entering into the posterior lateral edge of the cranium, and the lateral process constituting the inferior lateral edge; lateral crests of cranium obliterated; the two ante-

* "The figure given by Professor Agassiz is ambiguous."—Original note.

rior vertebræ normal, and the foremost intimately connected with the cranium and overarched by the backward extended and nearly horizontal exoccipital condyles; the ribs sessile high up on the centra of the vertebræ or bases of the neurapophyses, and the principal epipharyngeals with the dentigerous surface expanded.

SCATOPHAGIDÆ.

Synonyms as family names.

= *Scatophagidæ*, Gill, Proc. U. S. Nat. Mus., V. 5, p. 560. 1883.
Squamipennes gen., Cuvier, Günther, *et al.*
Chætodontidæ gen., Bon., *et al.*
Pimelepteroidei gen., Bleeker, 1859.
Chætodontoidei s. f., Bleeker, 1876.

Synonym as subfamily name.

= *Scatophagiformes*, Bleeker, Arch. Neerland. Sc. exactes et Nat., t. 11, p. 302. 1876.

DESCRIPTION.

Body abbreviated, high, compressed, dorsadiform, or nuchadiform, with the breast convex, and with the contour extended backwards at the anal fin.

Anus submedian.

Scales minute, pectinate, regularly imbricated, closely adherent to the skin, and ascending on the soft portions of the dorsal and anal as well as the caudal fins, more or less covering the rays as well as the intervening membrane, and also extending on the wider surfaces of the dorsal and anal spines.

Lateralis concurrent with the back and uninterrupted.

Head small, little compressed, subrhomboid, with a high and abruptly ascending occipital crest.

Eyes in the anterior half of the head, separated by a very wide interorbital area, with the orbital margins free.

Nostrils double, in front of the eyes; those of each side moderately approximated to each other; the anterior with a small tubular extension; the posterior larger and a vertical cleft.

Mouth anterior, with the cleft nearly horizontal, little extended laterally, being mostly transverse and with a semicircular contour.

Jaws considerably modified from the normal acanthopterygian type; *intermaxillines* with short, partially consolidated and tapering branches, but not attenuated behind dentiferous area; *supramaxillines* deflected downwards behind and with a lamelliform expansion upward before the deflection; *dentaries* with flattish inferior and lateral extensions; *articular* cuneiform, between the inferior and lateral extensions of the dentary, and with the cotylus very low and posterior; *angular* mostly internal.

Teeth elongated, setiform; the shorter simple, the longer with trifid

points, in a band on each jaw; the external pleurodont or attached to the surface of the jaws.

Lips very thin on the upper jaw, obsolete on the lower.

Tongue moderate.

Suborbitals well developed; the preorbital rather high, with a free inferior margin and covering the sides, connected suturally by two processes with the palatine arch of the jaws; the succeeding bones narrow but with wide subocular expansions; the posterior connected with the preoperculum.

Opercular apparatus normally developed; *preoperculum* large and extending downwards, with a free inferior as well as posterior margin; *operculum* well developed; *suboperculum* continuous with and bordering the operculum; *interoperculum* narrow and concealed under the inferior margin of the preoperculum.

Branchiotremes ample and continuous below, but restricted in front by the branchiostegal membrane, which is broad and but slightly emarginated behind, being continuous between the rami of the jaws and confluent in front with the skin of the dentary, and separated on the sides from the preoperculum by a groove or furrow.

Branchiostegals involved in thick skin and only discernible on dissection, seven on each side.

Dorsalis divided into a longer anterior portion with ten to twelve robust heteracanth spines and a posterior shorter portion composed of branched rays.

Analis confined to the posterior half of the body, with an anterior well differentiated portion having four large heteracanth spines, and with a soft portion nearly corresponding to the soft portion of the dorsal.

Caudalis well developed, emarginated or with a nearly entire posterior margin, with fourteen branched rays, and with few raylets.

Pectorales normally inserted, rather small, with the rays branched and rapidly decreasing downwards.

Ventrales thoracic, inferior, and approximated; each with a spine and five branched rays decreasing inwards, covered on the external surface with small scales; closing at the base in a rudimentary excavation formed by folds of the skin; without any axillary appendages.

REMARKS.

The *Scatophagidæ* will be thus seen to be very trenchantly separated from the *Chætodontoidea* as well as all other families, so far as their characters are known. The *Chætodontoidea* are well distinguished by the abbreviated anterior vertebræ and their peculiar relations, as well as by the inferior insertion of their ribs—characters reënforced by numerous others.*

* The characteristics of the *Chætodontoidea* were indicated by the author in 1883 (Proc. U. S. Nat. Mus., v. 5, p. 559).

Professor Cope instituted a group of the percomorph fishes termed *Epilasmia*, and especially characterized by having the "second, third, and fourth superior pharyngeals transverse vertical laminæ." He included therein the *Acronuridæ* (= *Teuthididæ* + *Siganidæ*) and *Chætodontidæ* (= *Chætodontidæ* + *Zanclidæ* + *Ephippiidæ* + *Platacidæ* + *Toxotidæ*), but did not include *Scatophagus*, nor did he elsewhere refer to it. The terms of his definition, however, would exclude the *Scatophagidæ* from the *Epilasmia*, while that of the *Distegi* would apply to it.

If regard is paid to old definitions of families, no objection can be raised because the definition of one applies to it more than another. Dr. Günther's definition of the *Squamipinnes*, for example, is as applicable to some *Serranidæ* as it is to some of his *Squamipinnes*. The so-called family *Squamipinnes* is indeed a thoroughly artificial group not entitled to a moment's consideration, and its long tenure of life was only possible because of the stagnation of systematic ichthyology and because naturalists were willing to accept ideas from a spirit of conservatism and without investigation. That spirit has permitted ichthyologists for many years to regard as of prime importance the extension of scales on the vertical fins in spite of the fact that the degree of such extension is most variable, and that the extension or non-extension of scales on the fins of other fishes is regarded as of slight importance.

Several assigned osteological characters need notice, as otherwise they might be considered to be indorsed.

Dr. Günther has claimed that "the centre of the first vertebra is not developed." (Cat., v. 2, p. 59.) This statement is doubtless due to the fact that the centrum of the first vertebra is so intimately united with the basioccipital that the suture appears to be obliterated. The vertebra is in fact well developed, and contrasts especially with that of the *Chætodontoidea* by its length and position.

Dr. Günther has assigned "a recumbent spine before the dorsal pointing forwards" (Cat., v. 2, p. 58). This character has proved to be a stumbling block to one naturalist especially. Mr. Charles DeVis has distinguished two species, one from *Scatophagus argus* (named *S. quadrannus*) and another from *S. multifasciatus* (named *S. ætaterarians*), because the supposed new species had no procumbent spines, while the old ones had.* There is, however, no recumbent spine open to view in the typical *Scatophagi* more than in the Australian fishes. The basis of Dr. Günther's diagnosis is in the fact that the anterior interspinals have thin heads deflected forward in a spiniform manner before the dorsal fins, although in a less degree than in *Chætodontidæ*:* there is no distinctive character in this, nor is the interspinal prominent above the skin.

Dr. Günther affirms that "there are no spurious interneurals." In

* New Australian Fishes in the Queensland Museum. Part II. By Charles W. De Vis, M. A. <Proc. Linn. Soc. N. S. Wales, v. 9, pp. 453–462 (455–456), 1885.

* In *Pomacanthus paru* the interspinal has a very acute hastiform recumbent head.

the skeleton before me, there are two slender spurious interneurals (*i. e.*, interneurals having no connection with the dorsal fin) appressed to the large third interneural and, like the third, with the dorsal extremities bent forward in a spiniform manner.

Dr. Günther asserts that "the first interneural is the strongest, reclined backwards, and superiorly armed with a spine pointed forwards." It is the third interneural that is the strongest, and its dorsal extremity is pointed forward in a spiniform manner, but there is no specialized or independent spine pointed forwards, as might be inferred from the expression used.

SKELETAL ICONOGRAPHY.

The only figures of the skeleton of *Scatophagus* I know are the following:

Scatophagus argus.

Chætodon striatus Rosenthal, Ichthyotom. Tafeln, pl. 13, f. 2. 1821. (Skel.)

Scatophagus argus, Agass., Recherches Poiss. Foss., t. 4, p. 230, pl. H, f. 1. (Skel.)

GENUS.

Only one genus, so far as known, is referable to the family *Scatophagidæ*; that genus was named *Scatophagus* by Cuvier in 1830. The name *Scatophaga** having been previously (1803) given by Meigen to a genus of dipterous insects, and the two forms (*Scatophaga* and *Scatophagus*) being considered to be synonymous, a new name—*Cacodoxus*—was conferred on the Cuvieran genus by Cantor in 1850. Still later, the Cuvieran name *Ephippus* was revived by Bleeker (in 1876) for the later named *Scatophagus*, simply because the *S. argus* happened to be first named in connection with the *Ephippi*. What name, then, shall be accepted for the genus in question?

Scatophagus appears to be sufficiently distinct from *Scatophaga* (as *Picus* is from *Pica*) and therefore *Cacodoxus*, or any other new name, is unnecessary. *Ephippus* was subsequently restricted by Cuvier to the genus to which it is now universally applied, and whose typical species was at first referred to the old genus so named. Notwithstanding the fact that *S. argus* was first mentioned, the name *Ephippus* was evidently for the Ephippiids of later writers, and must be therefore retained for such. It follows that the names *Scatophagus* and *Ephippus* may be retained with their current applications. *Sargus* was not only anticipated by *Scatophagus* and *Cocodoxus*, but preoccupied in entomology and ichthyology. *Scathophagus* is merely a *lapsus calami* or typographical error.

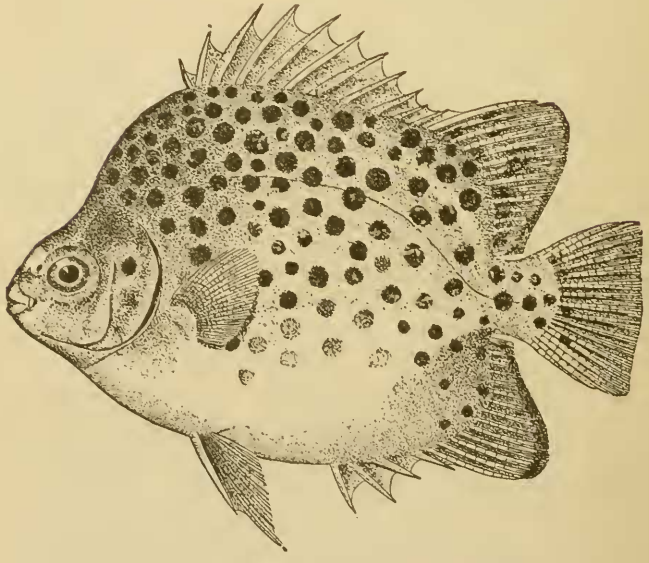
The synonymy of *Scatophagus* may be thus summarized:

*The dipterous genus was made the type of a peculiar subfamily (*Scatophagina*) by Desvoidy, in 1830.

SCATOPHAGUS.

Synonymy.

=*Scatophagus* Cuv. and Val. Hist. Nat. Poiss., t. 7, p. 136, 1830.
=*Cacodoxus* Cantor Cat. Mal. Fish, p. 163, 1850.
=*Sargus* Gron. Cat. Fish, p. 65, 1854.
=*Ephippus* Blkr. Arch. Neerl. Sc., t. 11, p. 302, 1876 (vix Cuv.)
=*Scathophagus* Zittel Handb. Pal., I. Abth., v. 3, p. 299, 1888.
Type *Sargus*.



Scatophagus argus.